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The Aerovox Research Worker

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A Dictionary of Capacitor Applications and Recommended Types

By the Engineering Department, Aerovox Corporation

WHILE the appearance of capacitors in electrical and electronic circuits is frequent and varied, and the types of capacitors numerous, one or more of certain basic functions will be found always to be performed by these components. These functions are:

1. Blocking
2. Bypassing
3. Coupling
4. Filtration
5. Frequency Determination
6. Timing
7. Voltage Multiplication by Reservoir Action.

It is aimed to list in concise dictionary form the types of capacitors recommended specifically for each of the common applications in which the above functions are performed. This material is intended as practical data for workers in the fields of electronics and electricity in whose minds (as our daily correspondence would indicate) the question of capacitor choice frequently must arise.

Space requirements have necessarily called for digesting of the material. However, we have tried to include all of those applications which are ordinarily encountered and which, by their nature, will suggest certain subordinate applications which have been eliminated.

This glossary lists only the principal applications of capacitors. It is not complete in its treatment of capacitor types and uses, and numerous applications other than those listed may occur to the reader.

AUDIO AMPLIFIERS

Buffer Capacitor (voltage divider tap): Wax, oil 1-4 mfd.; electrolytic 5 mfd. and higher.

Bypass: Wax, oil 0.01-4 mfd.; electrolytic 5 mfd. and higher.

Coupling: Wax, oil above 0.01 mfd.; mica, wax 0.003-0.01 mfd.; ceramic below 0.01 mfd.

Decoupling: Wax, oil 0.1-4 mfd.; electrolytic 5 mfd. and higher.

Degenerative Feedback: Mica, ceramic, wax, oil to 0.003 mfd.; wax, oil above 0.003 mfd.

Frequency-Dividing Networks: Mica to 0.01 mfd.; oil above 0.01 mfd.

Hum Balancing: Wax, oil, ceramic.

Power-Line Bypass: Wax, oil (rated at twice peak line voltage).

Power-Supply Filter: Oil 1-5 mfd.; electrolytic 8 mfd. and higher.

Selective Frequency Filters: Mica, ceramic to 0.01 mfd.; oil above 0.01 mfd.

Tone Control: Mica, ceramic, wax to 0.003 mfd.; wax, oil above 0.003 mfd.

AUTOMOTIVE

Ammeter: Wax (metal can).

Distributor: Wax (metal can).

Dome Light: Wax.

Gas-Gauge Filter: Wax.

Generator: Oil (metal can).

Oil-Gauge Filter: Wax.

Radio Vibrator: Mica, oil (metal can).

CARRIER CURRENT: Mica, high-voltage, high-current oil.

DIATHERMY: (See R.F. Heating).

ELECTRIC WELDING: Oil (metal encased).

FIRE ALARM: (See Telegraph).

FILTERS: (See Power Supply, Wave Filters).

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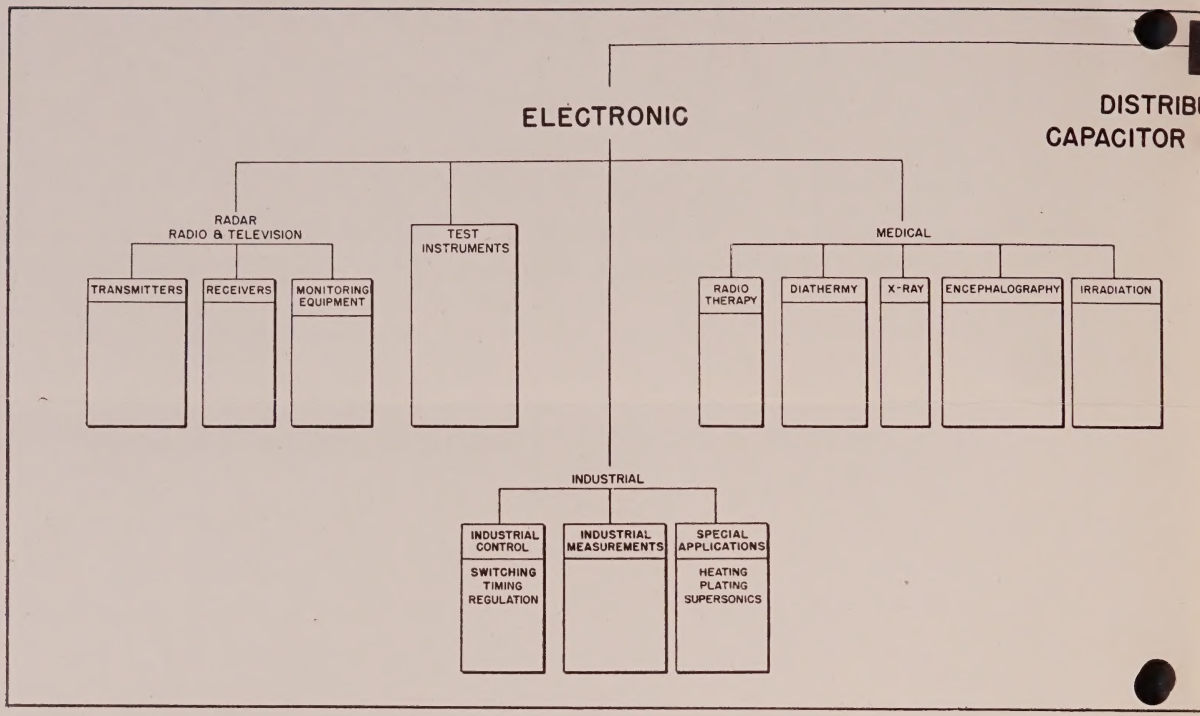


IMPULSE GENERATORS: Mica, high-voltage oil.

INTERCOMMUNICATOR SYSTEMS: (See Audio Amplifiers, Radio Receivers).

INTERFERENCE ELIMINATION

Electric Motor: Oil, wax (metal can).
Electric Razor: Wax, mica.
Fans, Driers, Mixers: Wax, oil.
Fluorescent Lamps: Wax, oil.
Ignition Systems: Oil (metal can).
Intermittent Contacts: High-voltage, midget mica, oil.
Neon Lamps: Wax.
Oil Burners: Mica to 0.01 mfd.; oil (metal can) beyond 0.01 mfd.

MEDICAL EQUIPMENT: (See Diathermy, X-Ray Equipment).

MOTOR STARTING AND RUNNING: Electrolytic where operation and installation permit; oil in all other instances.

MULTIVIBRATORS

Bypass: Mica, ceramic to 0.01 mfd.; wax, oil higher than 0.01 mfd.
Coupling: Mica, ceramic to 0.01 mfd.; oil higher than 0.01 mfd.
Feedback: Mica, ceramic to 0.01 mfd.; oil higher than 0.01 mfd.

OSCILLOSCOPES: Mica, ceramic to 0.01 mfd.; wax 0.003-1 mfd.; oil 0.012-4 mfd.; electrolytic higher than 5 mfd.

PHASE-SHIFTING NETWORKS: Mica, ceramic to 0.01 mfd.; wax, oil beyond 0.01 mfd.

PHOTO-TIMERS: (See Time Delay).

POWER FACTOR CORRECTION: High Voltage Oil.

PUBLIC ADDRESS SYSTEMS: (See Audio Amplifiers).

PULSE GENERATORS: (See Multivibrators).

RADIO RECEIVERS

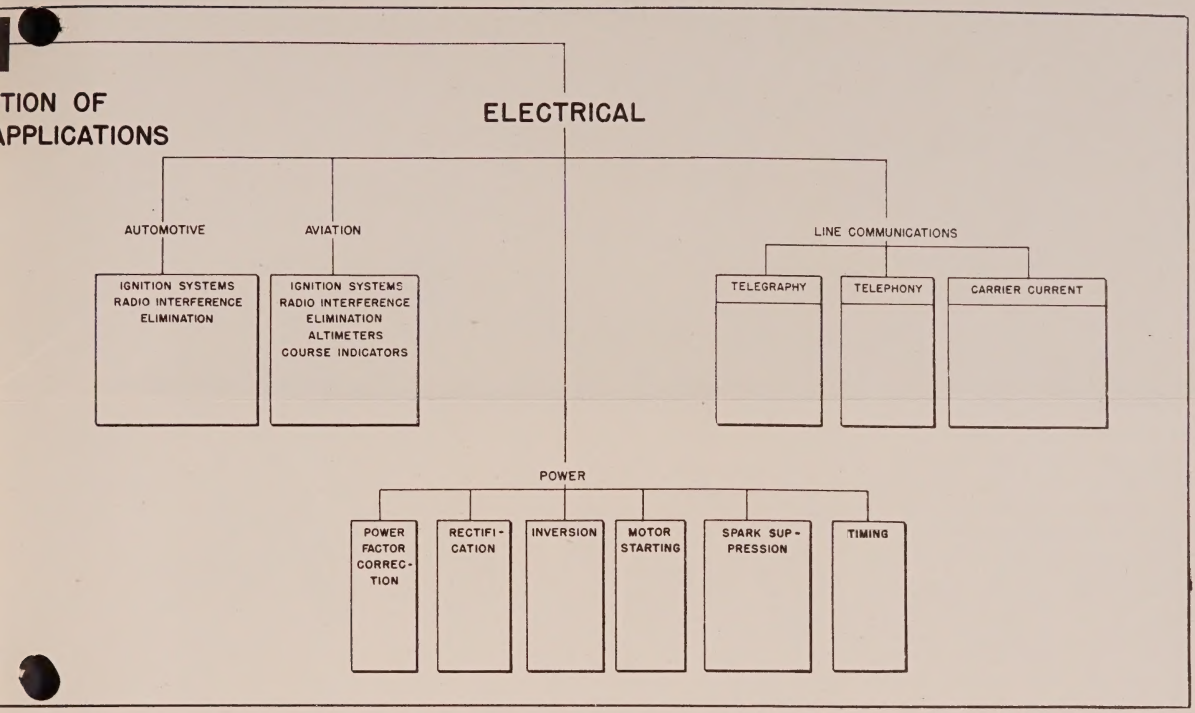
Antenna Coupling: Mica, ceramic.
Antenna Substitute: Mica, ceramic, wax.
Buffer Capacitor (Auto Radio): Midget high-voltage mica, oil.
Buffer Capacitor (voltage-divider tap): Wax, oil 1-4 mfd.; electrolytic 5 mfd. and higher.
Bypass, A.F.: Wax, oil to 1 mfd.; electrolytic 4 mfd. and higher.
Bypass, R.F.: Mica, ceramic to 0.01 mfd.; wax 0.003-1 mfd.; wax, oil above 0.01 mfd.
Coupling, A.F.: Mica, ceramic to 0.01 mfd.; wax, oil 0.003 mfd. and beyond.
Coupling, R.F.: Mica, ceramic polystyrene.
Decoupling: Mica to 0.01 mfd.; wax, oil to 2 mfd.; electrolytic 5 mfd. and higher.
Feedback (Degenerative A.F.): Mica, ceramic, wax to 0.01 mfd.; wax, oil beyond 0.01 mfd.
Feedback (R.F.): Mica, ceramic.
Grid Capacitor: Mica, ceramic.
Hum Balancing: Wax, oil.
Padder, R.F.: Mica, ceramic.
Power-Line Bypass: Wax (rated at twice peak line voltage).
Power-Supply Filter: Oil 1-5 mfd.; electrolytic 8 mfd. and higher.
Tone Control: Mica to 0.01 mfd.; wax 0.003-1 mfd.; wax, oil beyond 0.01 mfd.
Tuning Capacitor (in L-C Circuits): Mica or ceramic in both r.f. and i.f. circuits.

RADIO TRANSMITTERS
(MODULATOR SECTION)

Bypass: Wax, oil 0.01-4 mfd.; electrolytic 5 mfd. and higher.
Coupling: Wax, oil (depending upon operating voltage).
Decoupling: Oil 0.1-4 mfd.; electrolytic 5 mfd. and higher.
Degenerative Feedback: Mica or ceramic to 0.01 mfd.; oil above 0.01 mfd.

RADIO TRANSMITTERS
(POWER SUPPLY SECTION)

Buffer: Electrolytic, low-voltage tap; oil, high-voltage tap.



Filter: Electrolytic in low-powered transmitters; oil in high-powered outfits.

Power-Line Bypass: Wax, oil (rated at twice peak line voltage).

RADIO TRANSMITTERS
(R.F. SECTION)

Antenna Coupling: Mica.

Blocking: Mica, special oil types designed for mica substitutes.

Bypass (cathode circuit): Mica or ceramic to 0.01 mfd.; oil above 0.01 mfd. (special oil types may be employed throughout as mica substitute).

Bypass (plate and screen circuits): Mica.

Coupling: Mica.

Feedback: Mica.

Grid Capacitor: Mica.

Harmonic Suppressor: Mica.

Hum Balancing: Mica, wax, oil to 0.01 mfd.; oil above 0.01 mfd.

Padder: Mica.

Tank Capacitor: Mica in all L-C circuits.

RECTIFIERS & POWER SUPPLY EQUIPMENT

Buffer: High-voltage mica in vibrator units; electrolytic in voltage divider applications.

Commutator Ripple Smoothing: Wax, oil, electrolytic.

Filter: Wax (low-voltage power units), oil (high-voltage power units) to 4 mfd.; electrolytic beyond 4 mfd. (use in series for higher than individual rated working voltage).

Inverter: Oil.

Power-Line Bypass: Wax, oil (rated at twice peak line voltage).

Voltage-Multiplier Capacitor: Electrolytic at low peak voltages, oil at high peak voltages.

RESISTANCE-TUNED CIRCUITS: (In simple filters, a.f. oscillators and wave analyzers), mica, ceramic to 0.01 mfd.; oil beyond 0.01 mfd.

R.F. HEATING

Blocking: Mica.

Bypass (cathode circuit): Mica, wax to 0.01 mfd.; oil beyond 0.01 mfd.

Bypass (plate or screen circuits): Mica.

Coupling: Mica.

Feedback: Mica.

Grid Capacitor: Mica.

Padder: Mica.

Tank Capacitor: Mica.

SOUND RECORDING

Needle-Scratch Filter: Mica, wax to 0.01 mfd.; wax beyond 0.01 mfd.

For other listings, see Audio Amplifiers.

SPARK SUPPRESSION: High voltage mica to 0.01 mfd.; oil beyond 0.01 mfd.

STANDARDS OF CAPACITANCE: For bridges, capacitance meters, etc., use single mica units to 0.01 mfd. and parallel arrangements of 0.01 mfd. units as far as 1 mfd.; electrolytic at high capacitances, provided the high power factors of the latter units may be tolerated.

TELEGRAPH

Cross-Talk Elimination: Oil, wax.

Line Balancing: Oil.

Line Termination: Oil.

TELEPHONE (not including amplifiers and repeaters): Oil, wax in straight line applications; mica and oil in carrier-current service.

TELEVISION EQUIPMENT: (See Radio Receivers, Radio Transmitters).

TIME DELAY: Mica, ceramic to 0.01 mfd.; oil 0.01-5 mfd.; electrolytic beyond 5 mfd. where operating voltage and permissible leakage permit. Motor-starting types particularly suitable for high time constants.

WAVE FILTERS

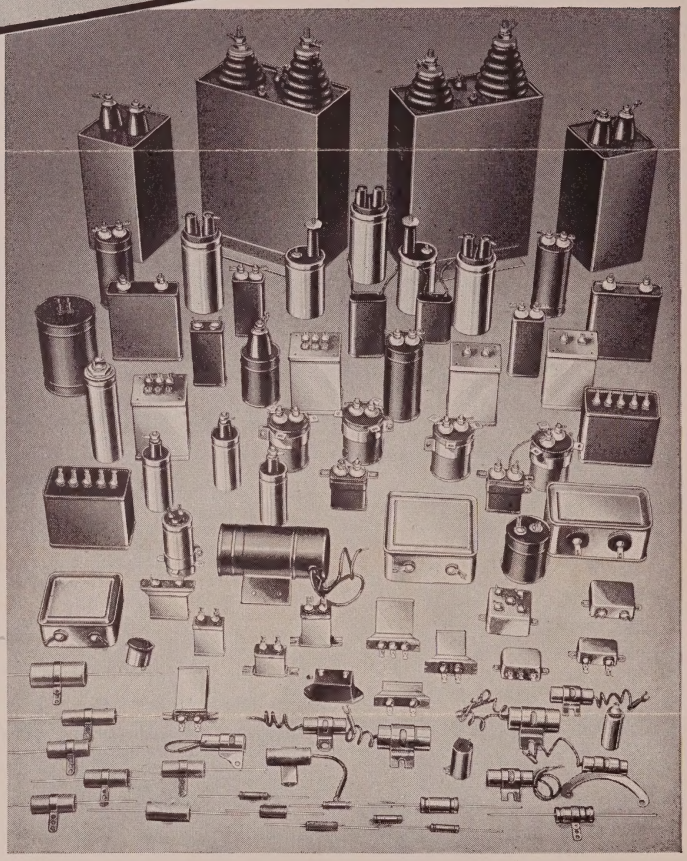
A.F.: Mica, ceramic to 0.01 mfd.; oil higher than 0.01 mfd.

R.F.: Mica, ceramic.

WELDING: (See Electric Welding).

X-RAY EQUIPMENT: High-voltage oil.

A TYPE FOR *Every* APPLICATION
OIL-FILLED CAPACITORS



● Functionally fitted to given application—that's the keynote of the extensive Aerovox oil-filled capacitor line. A plentiful selection of containers, mountings, terminals, sizes and impregnants, assures virtually custom-built capacitors with guaranteed performance.

Aerovox offers both Hyvol and Hyvol-M (mineral oil) liquid impregnants. For applications subjected to wide temperature variations, and where weight and size are important, Hyvol is recommended. Hyvol capacitors are considerably more constant with temperature variations than are those with other impregnating materials of the same specific inductive capacity, showing no capacitance drop until temperatures of −20° F. (−29° C.) are reached. At −40° F. (−40° C.) the maximum capacitance drop that may be expected is of the order of 5 to 10%.

Hyvol-M (mineral oil) capacitors have an exceptionally flat temperature coefficient of capacitance curve but approximately 35% greater bulk and corresponding weight which usually rules them out in favor of Hyvol.

At any rate, Aerovox offers both Hyvol and mineral oil capacitors, as well as wax-impregnated units for limited service—along with that wide choice of containers, mountings, terminals—to meet your exact needs.

● **NEW CATALOG** lists the exceptionally wide selection of Aerovox oil capacitors, as well as other types. Write on business letterhead for registered copy available only to engineers, designers, electronic maintenance men, manufacturers of equipment, and executives.

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